

BCF SCIENTISTS TAG AND RECOVER MENHADEN

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In 1965, BCF biologists at Beaufort, N.C., began an extensive tagging program on the Atlantic menhaden, *Brevoortia tyrannus*. Later, they expanded the program from New York to Florida. In 1969, they tagged Gulf menhaden, *B. patronus*, from Cameron, La., to Moss Point, Miss. These studies are timely because of the record low catch in the Atlantic and the record high catch in the Gulf in 1969.

The results of this tagging provide direct evidence of growth, mortality rates, interchange of fish between fishing areas, and the importance of certain estuaries in the production of menhaden. This information is needed to determine the causes of fluctuations in menhaden abundance--to assess effect of fishing on the populations, to develop estimates of optimum harvest, and to support recommendations for managing the fishery.

Tagging & Recovery Equipment & Methods

The program's initial phase was to test equipment and methods for tagging menhaden and recovering the tags. A tagging gun developed by a Norwegian firm, Bergen-Nautik, for tagging herring proved satisfactory for menhaden; it has been used in our studies. The gun inserts a stainless-steel tag ($\frac{9}{16}$ " by $\frac{1}{8}$ " by $\frac{1}{32}$ ") into the body cavity of the fish. The tags are recovered on magnets in menhaden reduction plants. An electronic tag detector has been used with some success in recovering marked fish as they are conveyed from boat to plant (photographs).

In 1966, nearly 97,000 menhaden were tagged and released in the Beaufort, N.C., area while we developed the best methods possible for procuring, holding, handling, and releasing the fish. Analysis of later recoveries showed that the best way of taking fish from commercial catches was either by brail or dip net; they did not have to be anesthetized for handling; and individuals released immediately after tagging survived better than fish

retained and released in a group. These procedures were used in a tagging program of the Atlantic menhaden fishery.

Expanded Tagging Program

In 1967, the program was expanded. Crews tagged menhaden in Florida, North Carolina, Chesapeake Bay, and New Jersey. We tagged 324,141 fish during the spring and summer, and 38,920 fish in the North Carolina fall fishery. Tag recoveries were increased by the installation of magnets in all menhaden plants on the Atlantic coast. In spring and summer 1968, BCF crews tagged 378,533 menhaden from New York to Florida; during fall fishery, 6,937 more. We also tagged 524 in December in Florida. This made 1968 our most productive tagging year: a total of 385,994 fish. In 1969, crews tagged 217,584 menhaden during spring and summer, and 3,091 during fall.

In 1969, BCF began the Gulf menhaden phase of its mark-recovery experiments; it continued tagging Atlantic menhaden. BCF magnets were installed at 4 plants in the Gulf area; 27,095 menhaden were tagged in spring. Recoveries of these tags during summer were encouraging. An additional 8,103 marked fish were released near end of fishing season.

The tagging of juvenile menhaden in tributaries also began in 1969. These fish were marked with tags about one fourth as large as those used for tagging commercial-size menhaden.

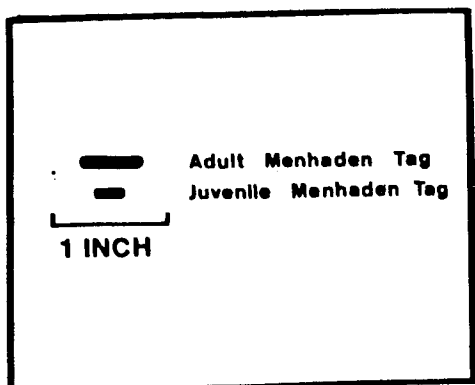
RESULTS

As of December 1969, more than 1,066,000 menhaden had been tagged and released in the Atlantic from New York to Florida. We estimate that nearly 203,000 tagged fish, or 19% of those released, have been recaptured (table). This percentage will increase when adjusted for tag losses due to shedding and mortality.

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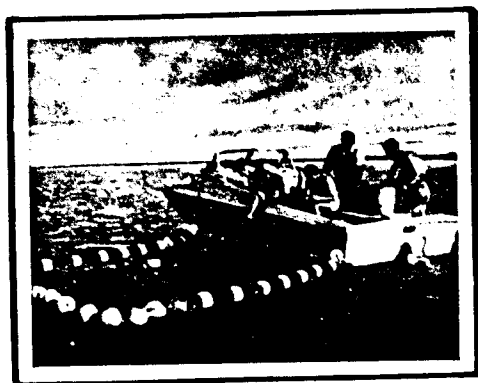
B. C. F. Menhaden Tagging and Recovery



Menhaden Tags



A Menhaden Being Tagged



Tagging Aboard B.C.F. Vessel



Tagging Aboard Commercial Fishing Vessel



Recovery of Tags From Magnets
in Menhaden Plant



Electronic Detector System for
Recovery of Tagged Fish

Menhaden Tagging: Yearly Releases and Estimated Recoveries				
Year	Location	Releases	Recoveries	
		Number	Number	Percent
1966	Atlantic	96,627	11,262	11.7
1967	Atlantic	363,061	91,083	25.1
1968	Atlantic	385,994	84,106	21.8
1969	Atlantic	220,675	16,586	7.5
	Gulf	35,198	6,860	19.5
Total:	Atlantic	1,066,357	203,037	19.0
	Gulf	35,198	6,860	19.5

Tag recoveries indicate that Atlantic menhaden move northward along the coast in spring and summer, and southward along the coast in fall and winter. As the fish get older and larger, they migrate farther north.

Tags continue to be recovered from fish released in 1966. This proves that fish can survive for an extended period with an internal tag. Actual recoveries from some groups of marked fish have been higher than 60%.

Through October 1969, more than 35,000 menhaden have been tagged and released along the Gulf coast from Cameron, La., to Moss Point, Miss. We estimate that nearly 6,900 tagged fish, or 19% of those released, have been recaptured (table). This percentage also will increase when we make adjustments for tag shedding and tagging mortality.

These data did not show much movement of tagged fish in the Gulf during their first summer after tagging. Some westward movement of fish released at Empire, La., was apparent; some Cameron releases may have moved east as far as Empire, but not as far as Moss Point. Recoveries in 1970 will provide our first information on movements of Gulf menhaden in the period between fishing seasons.

To estimate rates of mortality and growth from tag returns, recoveries are needed from several years of fishing. The determination of the amount of movement between fishing areas also requires several years of recoveries.

Information obtained from these studies of Atlantic and Gulf menhaden will help us to utilize wisely the menhaden resources.

